

NEW RIEGL VMQ[®]-3HA



World Premiere
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Use the latest advancements in RIEGL LiDAR Technology for your mobile applications:

3 MHz effective measurement rate
400 scan lines/sec scan speed

The RIEGL VMQ-3HA is a compact, economically priced High-Speed Single Scanner Mapping System, well suited for a variety of mobile mapping applications.

The system consists of a compact measuring head with a quick release system for convenient mounting. A swivel plate enables multiple mounting angles in order to optimize the field of view of the system. The optional integration of up to four cameras allows simultaneous acquisition of imagery to complement the captured LiDAR data.

The central part of the system is the fully integrated VUX-3HA LiDAR sensor providing 3 mio. measurements and up to 400 scan lines per second for an outstanding performance in mobile applications.



High Speed Single Scanner Mobile Mapping System

Typical Applications

- Transportation Infrastructure Mapping
- Road Surface Measurement
- HD Mapping for Autonomous Vehicles
- City Modeling
- Rapid Capture of Construction Sites and Bulk Material
- GIS Mapping and Asset Management
- As-Built Surveying
- Open Pit Mine Surveying

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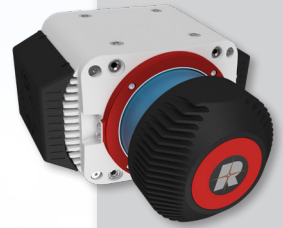


Key Features

RIEGL High-Performance LiDAR Sensor for Mobile Mapping

Core component of the RIEGL VMQ-3HA is the **kinematic LiDAR Sensor VUX-3HA**. The high-accuracy, high-speed laser scanner offers a maximum effective measurement rate of up to 3 MHz, 3 mm accuracy, 2 mm precision, a scan speed of 400 scan lines/sec, and a 360 degree "full circle" field of view.

Fully integrated into the measuring head of the VMQ-3HA, the sensor enables acquisition of dense point cloud patterns even with single passes at common traffic speeds.



RIEGL VUX-3HA
high-performance kinematic LiDAR sensor

VMQ-3HA Scan Pattern

3 MHz			3 m distance			10 m distance			50 m distance		
	line spacing @ 250 lps [mm]	line spacing @ 400 lps [mm]	point spacing @ 250 lps [mm]	point spacing @ 400 lps [mm]	pts/m ²	point spacing @ 250 lps [mm]	point spacing @ 400 lps [mm]	pts/m ²	point spacing @ 250 lps [mm]	point spacing @ 400 lps [mm]	pts/m ²
50 km/h	56	35	1.6	2.5	11450	5.2	8.4	3430	26.2	41.9	680
80 km/h	59	56	1.6	2.5	7160	5.2	8.4	2145	26.2	41.9	425
100 km/h	111	69	1.6	2.5	5730	5.2	8.4	1715	26.2	41.9	340
120 km/h	133	83	1.6	2.5	4775	5.2	8.4	1430	26.2	41.9	285

System Operation

By means of the swivel plate the measuring head can be set to seven different pre-defined mounting angles (-45° to +45° in 15° increments). This flexible system configuration allows the generation of different point cloud patterns meeting diverse project requirements and improving the scan pattern especially for multi-pass applications.

The VMQ-3HA is powered via the VM Power Supply Box. It provides power for the VMQ-MH Measuring Head, the DMI, and either for the VM-IU Interface Unit, or a data acquisition laptop. The VM Power Supply Box enables failsafe operation by redundant power input from the vehicles on-board power supply and a backup battery. The VM-IU is a compact data acquisition unit for convenient system operation. It provides extended disk space to store scan data as well as camera data.

Optionally the system can also be operated with a user laptop instead of the VM-IU, if no RIEGL cameras are used.



RIEGL MLS Systems
Camera Options

Explore the full range of camera options available for integration with the VMQ-3HA!

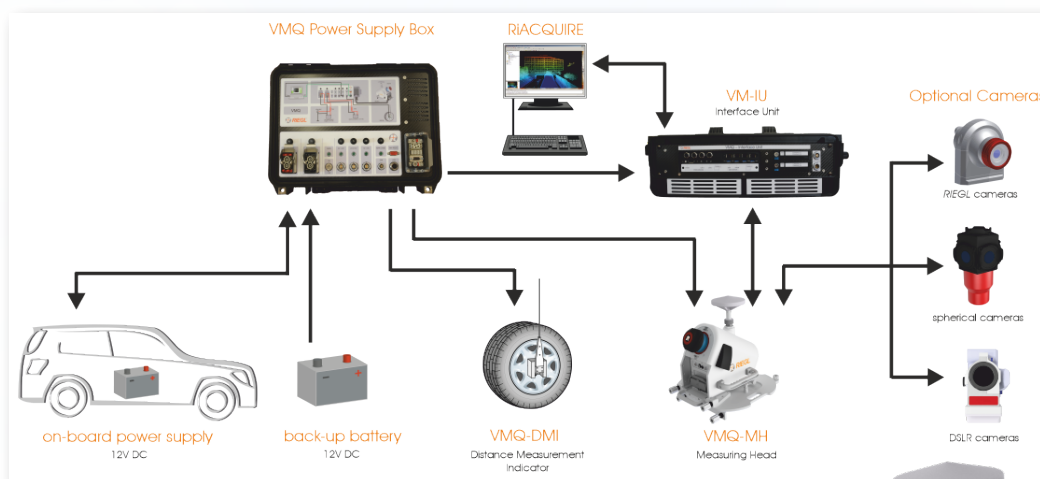
Seamless RIEGL Workflow

The RIEGL data acquisition software facilitates the operator's task in the field by providing real-time visualization of acquired scan data and imagery. The RIEGL software packages also offer comprehensive features in data processing. This covers enhanced scan data adjustment to merge overlapping mobile scan data. Furthermore it enables the scan data to be fitted to specific control objects which results in a consistent point cloud of enhanced precision and increased geo-referenced accuracy.



multiple swivel positions

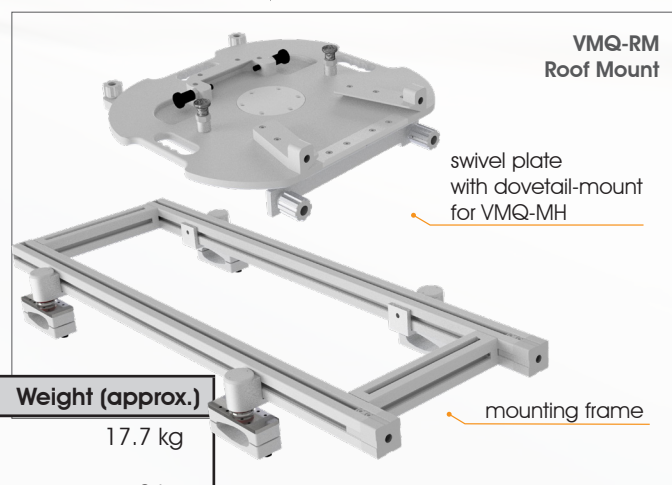
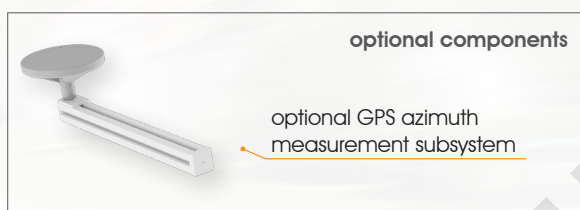
RIEGL VMQ-3HA System Block Diagram



RIEGL VMQ-3HA System Components:


- RIEGL VMQ-MH Measuring Head
- RIEGL VM-IU Interface Unit
- RIEGL VM Power Supply Box
- VM-DMI Distance Measurement Indicator
- up to 4 cameras (optional)
- sustainable power supply with back-up battery
- connecting cables


RIEGL VMQ-3HA Setup and Components




Physical Data

	Main Dimensions (L x W x H)	Weight (approx.)
VMQ-MH Measuring Head	496 x 387 x 507 mm	17.7 kg
VMQ-RM Roof Mount	1149 x 440 x 110 mm	9 kg
Mounting Frame	568 x 514 x 70 mm	13 kg
VM Power Supply Box	415 x 330 x 175 mm	7.8 kg
VM-IU Interface Unit	550 x 353 x 230 mm	14.8 kg
VMQ-MC Main Cable	standard length 5 m	8 kg


**RIEGL VMQ-3HA Technical Data**
 max. measurement range

 pulse repetition rate (peak)

 online waveform processing

 optional digital camera

 multiple target capability

 eye safe operation at Laser Class 1
VMQ-3HA Scanner Performance

Laser Class	Laser Class 1 (Class 1 Laser Product according to IEC 60825-1:2014)			
Effective Measurement Rate ^{1) 2)}	300 kHz	1000 kHz	1800 kHz	3000 kHz
Max. Range, Target Reflectivity $\rho \geq 80\%$ ^{3) 4)}	500 m	280 m	250 m	200 m
Max. Range, Target Reflectivity $\rho \geq 10\%$ ^{3) 4)}	180 m	100 m	90 m	70 m
Max. Number of Targets per Pulse ⁵⁾	31	15	8	5
Minimum Range	1 m			
Accuracy ^{6) 7)} / Precision ^{7) 8)}	3 mm / 2 mm			
Field of View	360° "full circle"			
Scan Speed (selectable)	up to 400 scans/sec			

1) Rounded values, selectable by measurement program.

2) Setting of intermediate PRR values possible.

3) Typical values for average conditions. Maximum range is specified for flat targets with size in excess of the laser beam diameter, perpendicular angle of incidence, and for atmospheric visibility of 23 km. In bright sunlight, the max. range is shorter than under overcast sky.

4) Ambiguity to be resolved by post-processing with RiUNITE software.

5) If more than one target is hit, the total laser transmitter power is split and, accordingly, the achievable range is reduced.

6) Accuracy is the degree of conformity of a measured quantity to its actual (true) value.

7) One sigma @ 30 m range under RIEGL test conditions.

8) Precision, also called reproducibility or repeatability, is the degree to which further measurements show the same result.

IMU/GNSS Performance

	AP+30	AP+50	AP+60
Position Accuracy Horizontal	typ. 0.02 m	typ. 0.02 m	typ. 0.02 m
Position Accuracy Vertical	typ. 0.03 m	typ. 0.03 m	typ. 0.03 m
Roll & Pitch Accuracy ⁹⁾	0.010°	0.005°	0.0025°
Heading Accuracy ⁹⁾	0.025° ¹⁰⁾	0.015° ¹⁰⁾	0.015°

9) Absolute accuracy specifications (RMS). Typical performance. Actual results are dependent upon satellite configuration, atmospheric conditions, and other environmental effects. Post processed using base station data. No GNSS outages, with DMI option.

10) Improved heading accuracy with dual antenna option @ 2 m baseline.

General Technical Data

Power Supply Input Voltage	11 - 15 V DC
Power Consumption	typ. 160 W (max. 220 W) ¹¹⁾
Temperature Range	-20°C ¹²⁾ up to +40°C (operation) / -20°C up to +50°C (storage)
Humidity	max 80% non condensing @ +31°C

11) with 2 x 12MP RIEGL camera

12) Requires that the scanner is powered up at or above -10 °C ambient temperature and held in continuous scanning operation. Insulating the scanner with appropriate material will enable operation at even lower temperatures.

Interfaces

Interfaces Measuring Head (VMQ-MH)	VM Power Supply Box	Interface Unit (VM-IU)
4x trigger pulse, exposure pulse, NMEA data (e.g. for optional cameras or additional devices) 1x PPS out pulse for synchronization of additional device 2x LAN, 1000 Mbit/sec for data transfer to control unit of external devices (e.g. image data acquisition) 1x secondary antenna connector for GPS azimuth measurement subsystem	1x DMI input (for distance measuring indicator; odometer) 1x NAV RS-232 (COM port for IMU/GNSS for RTK, SBAS) 3x power supply socket (2x 24V DC / 1x 12V DC)	4x LAN 1 Gbit/sec M12 sockets, 3 ports pre-configured 4x LAN 1 Gbit/sec RJ45 sockets, 2 ports pre-configured 4x USB 3.1 (e.g. image data transfer from a spherical camera) 1x display port 1x WLAN (integrated antenna) 1x Bluetooth (integrated antenna) 2x slots for removable hard disk 1x power supply input (+24V DC) 1x power supply output (+24V DC) for display (touchscreen)